Invasive species in Kansas

Brian Obermeyer
The Nature Conservancy

Sericea Lespedeza

Invasive species harm ecological systems, damage economies and threaten human well-being. The estimated damage from invasive species worldwide totals more than $1.4 trillion.

Flint Hills examples

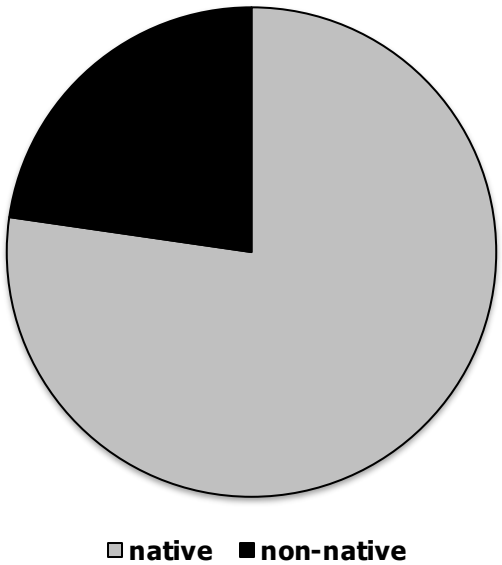
Old World Bluestems

The Nature Conservancy
Protecting nature. Preserving life.™

Management of non-natives (and problematic natives) requires some basic information

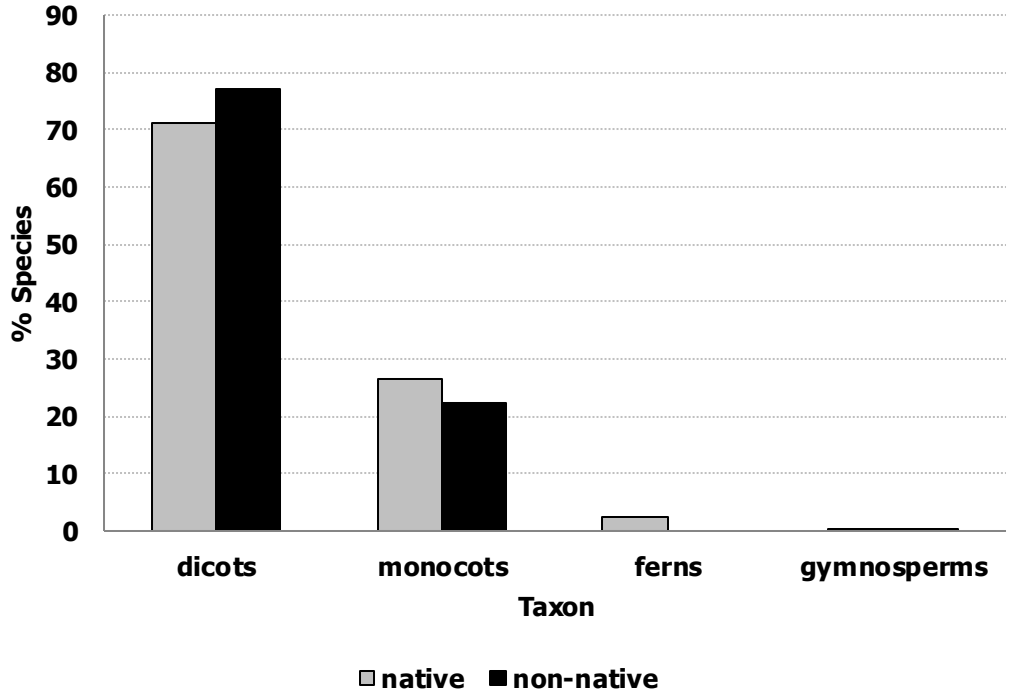
- Where did they originate from?
- When were they introduced?
- Life history characteristics?
- Where do they grow?
- How invasive?
- Can they persist and spread?
- Which pose the greatest threats to ecological systems and human activities?

Study of Weeds – Albrecht Dürer (1503)

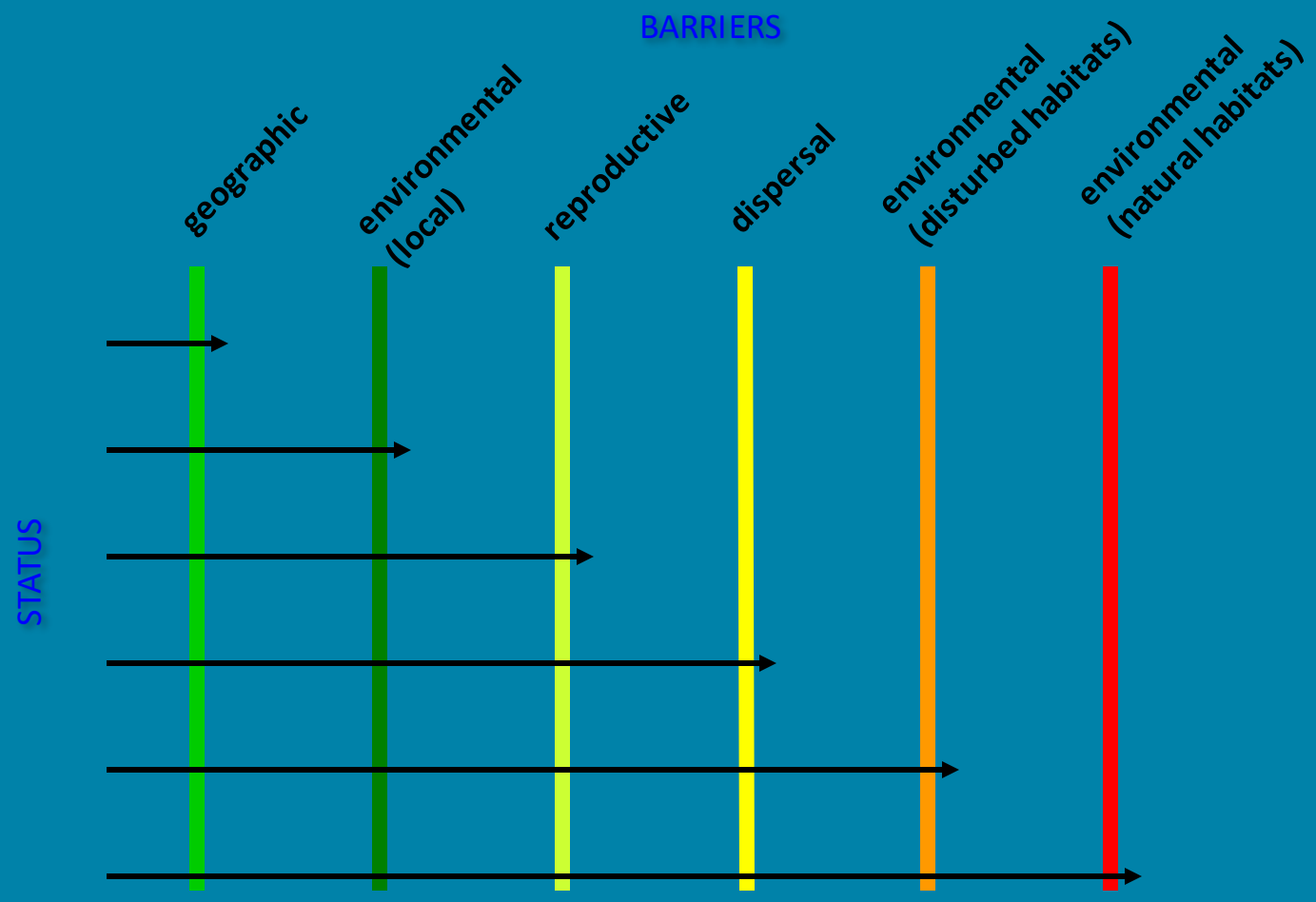


Approximately 23% of the 2,223 species of vascular plants documented in Kansas are non-native

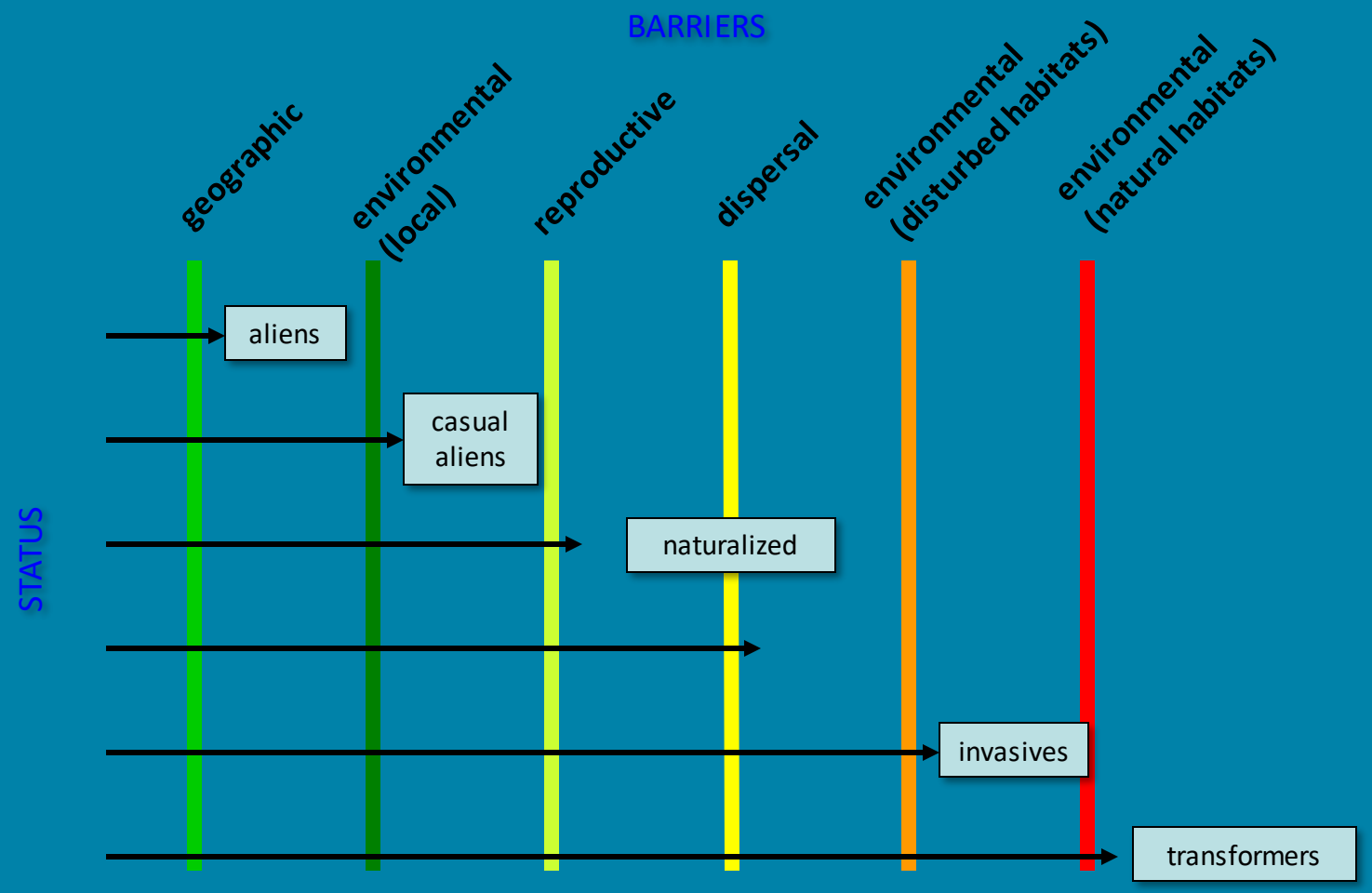
Dicots represent 77% of non-native species



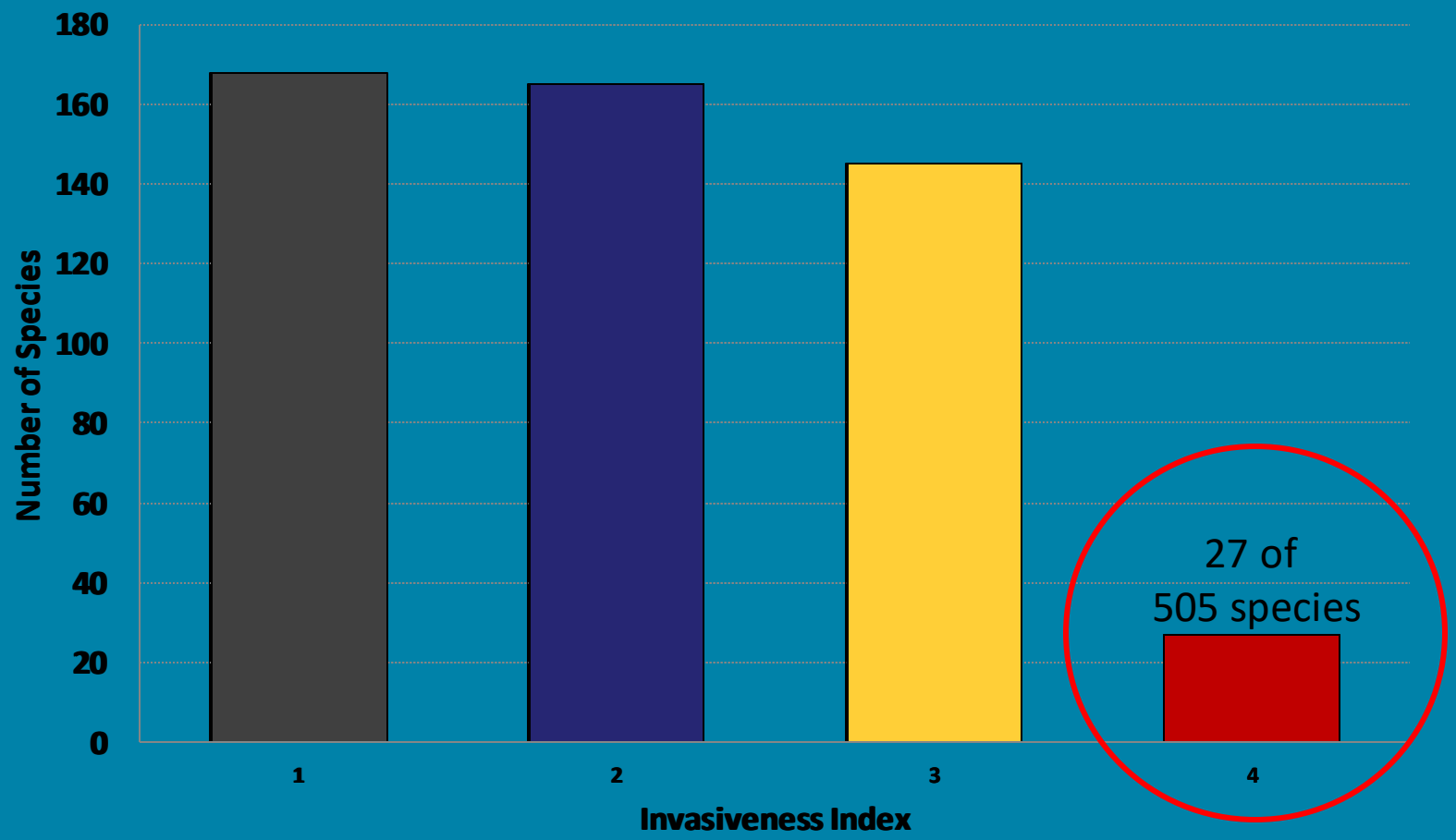
Relationships between environmental barriers & invasiveness of non-natives



Relationships between environmental barriers & invasiveness of non-natives



Estimated invasiveness of over 500 non-native species documented in Kansas



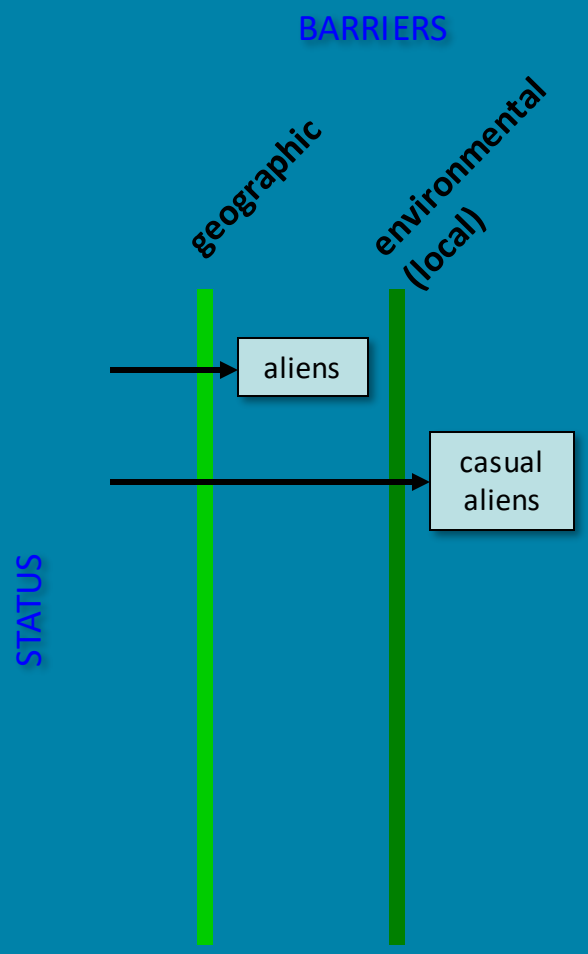
1 = casual aliens; 2 = naturalized; 3 = invasive; 4 = transformers

Craig C. Freeman, Univ. of KS

Casual Alien Plants

- Have overcome geographic and environmental barriers
- May flourish or reproduce in an area; do not form self-replacing populations
- Often rely on repeated introductions for persistence
- May be persisting or non-persisting
- 168 species (33.3%) of KS non-natives

Casual alien (persisting and non-persisting)



The Nature Conservancy
Protecting nature. Preserving life.™

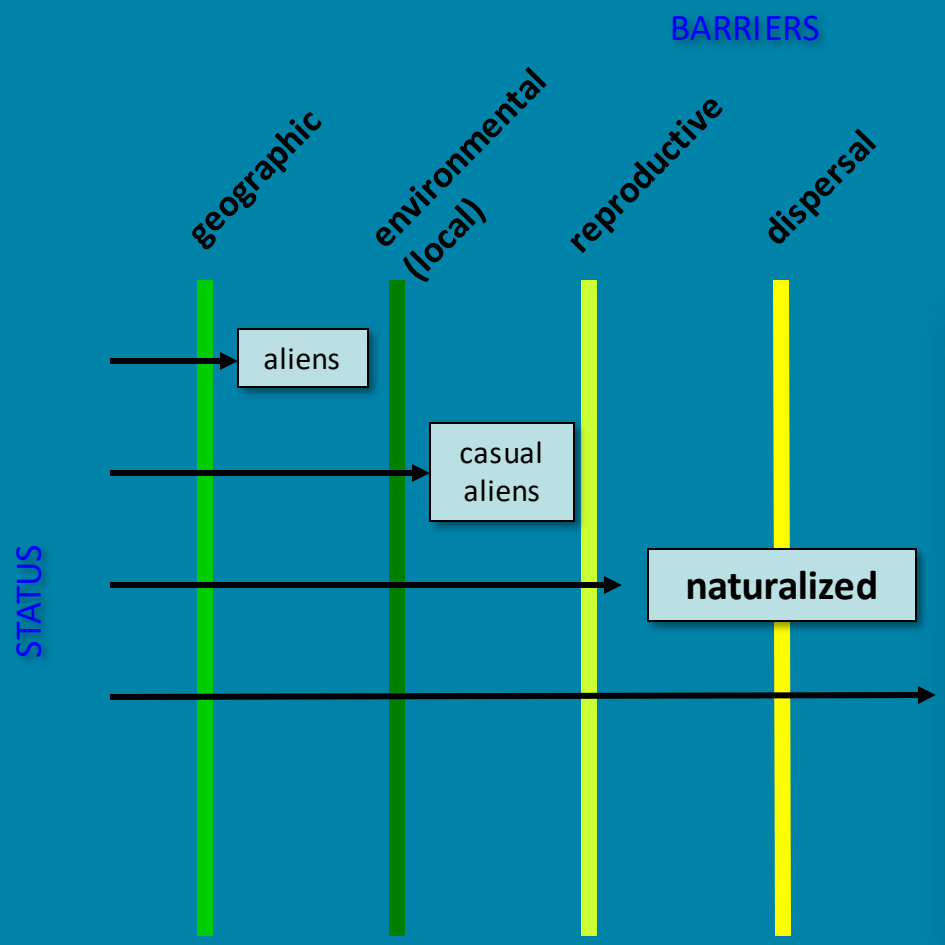
Naturalized Plants

- Have overcome geographic, environmental, reproductive and, sometimes, dispersal barriers
- Reproduce consistently; sustain populations over many life cycles without direct intervention by humans
- Typically do not invade semi-natural or natural habitats
- Recruit offspring freely, often near adults

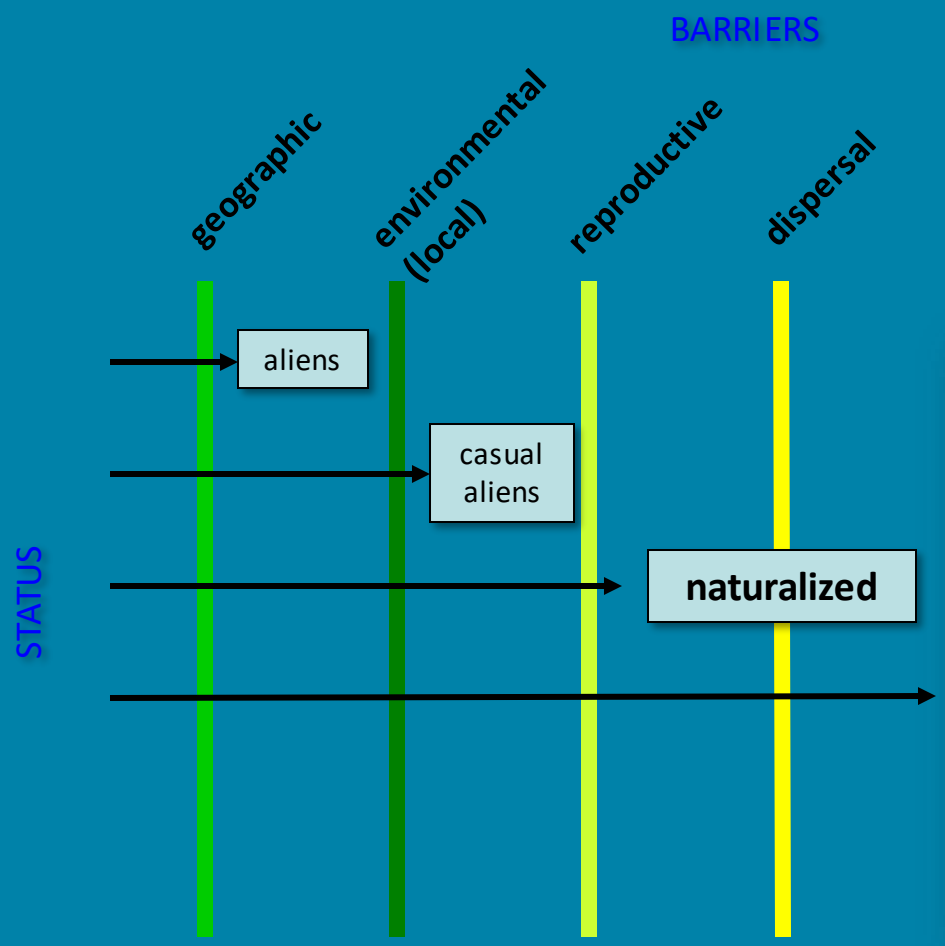
32.7% of KS non-natives

From Craig C. Freeman, Univ. of KS

Naturalized Plants



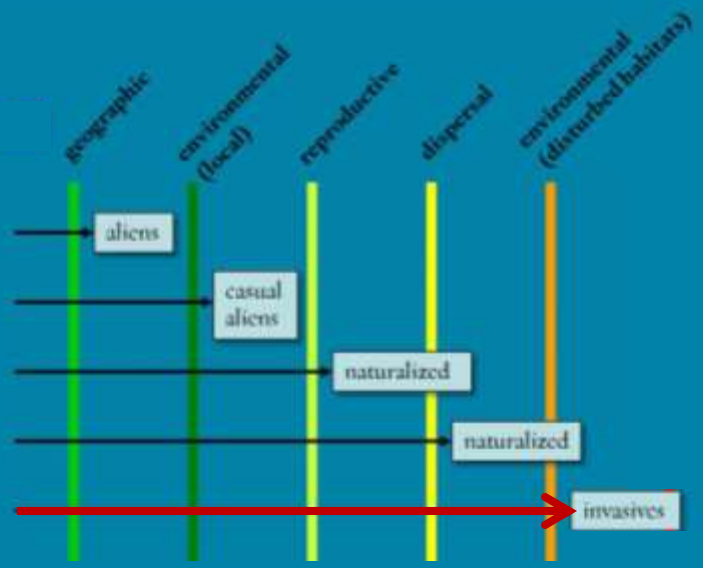
Naturalized Plants



Invasive Plants

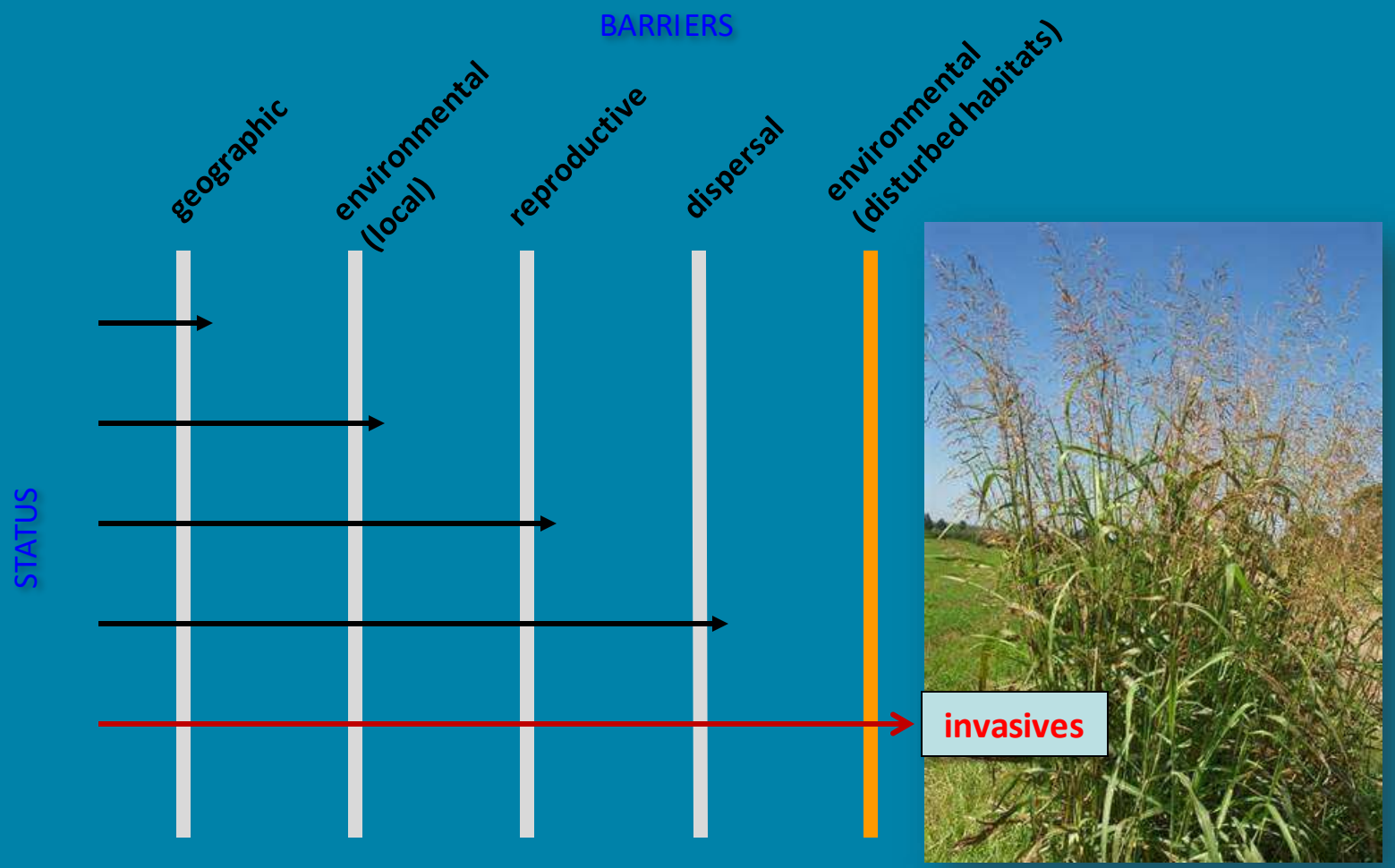
- Have overcome geographic, environmental, reproductive and dispersal barriers
- Invade disturbed, semi-natural and, sometimes, natural habitats
- Produce offspring, often in large numbers, at large distances from site(s) of introduction

28.7% of KS non-natives



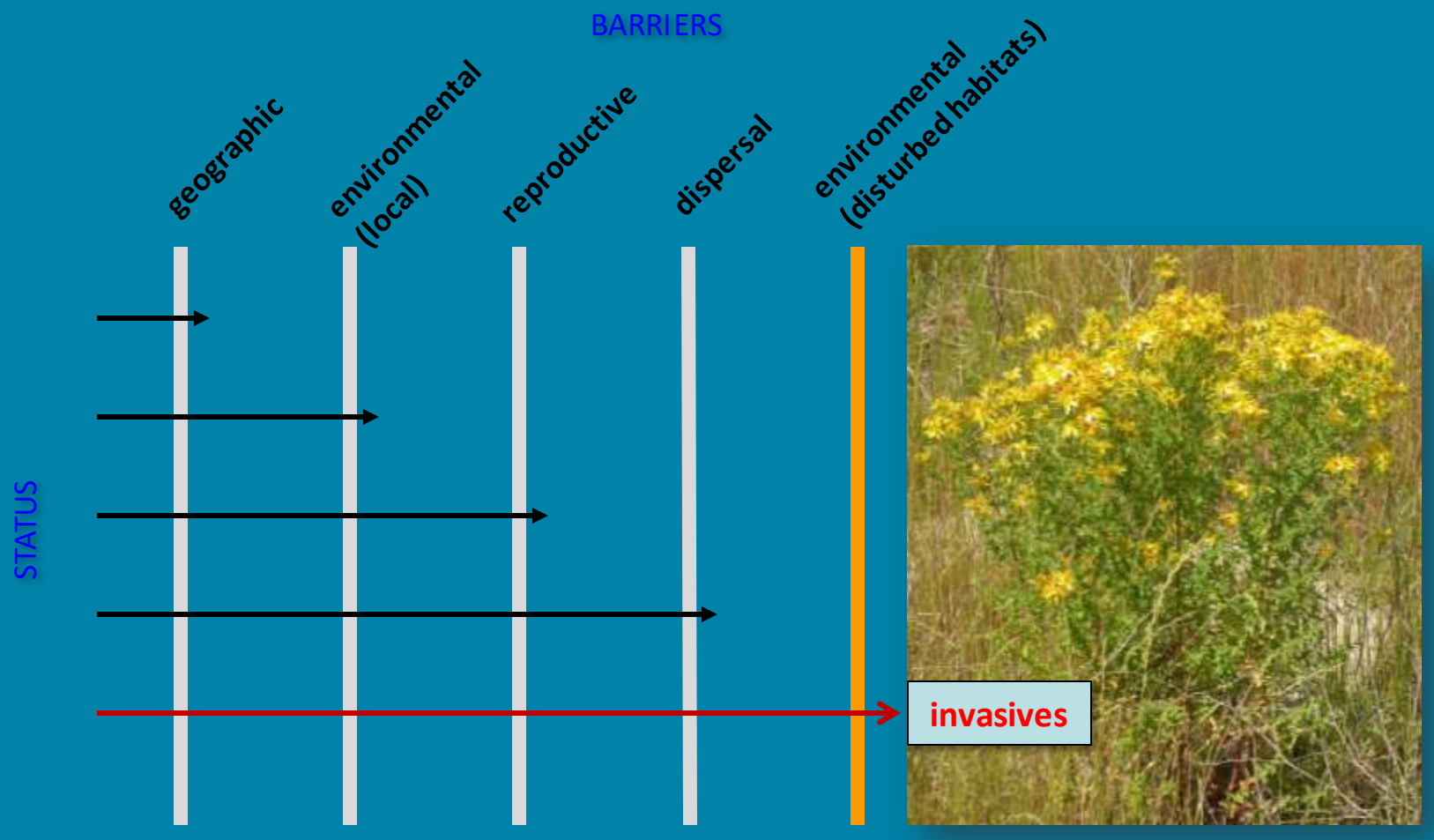
From Craig C. Freeman, Univ. of KS

Invasive Plants



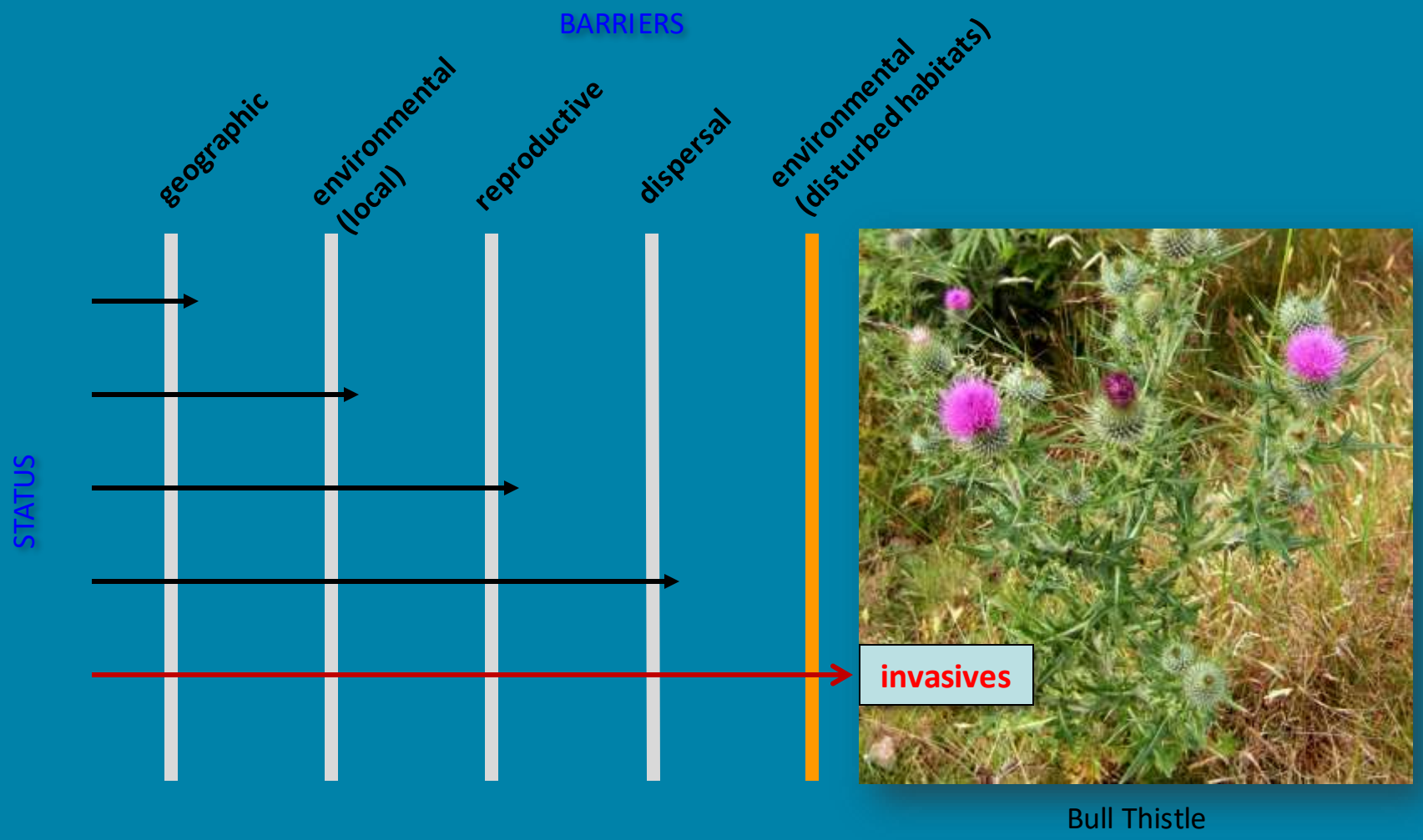
Johnsongrass

Invasive Plants



St. John's Wort

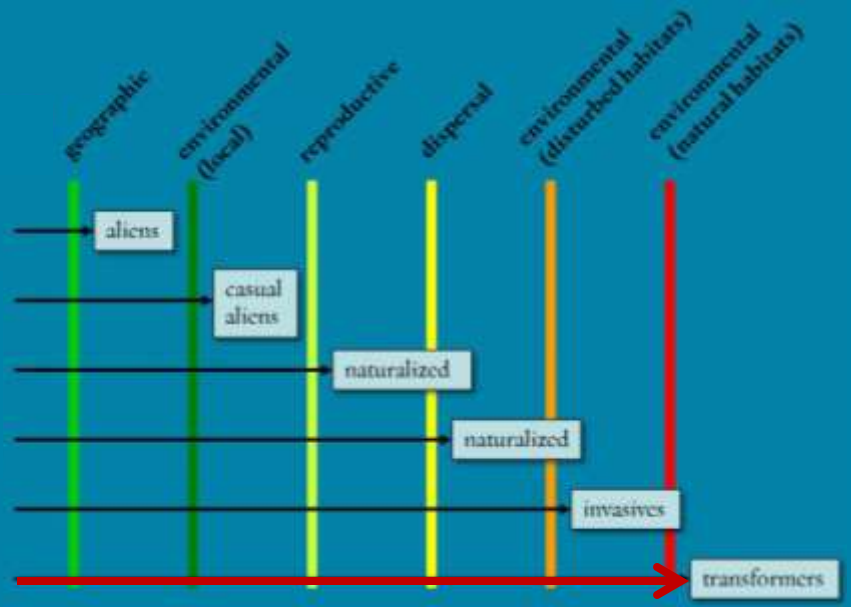
Invasive Plants



Transformer Species

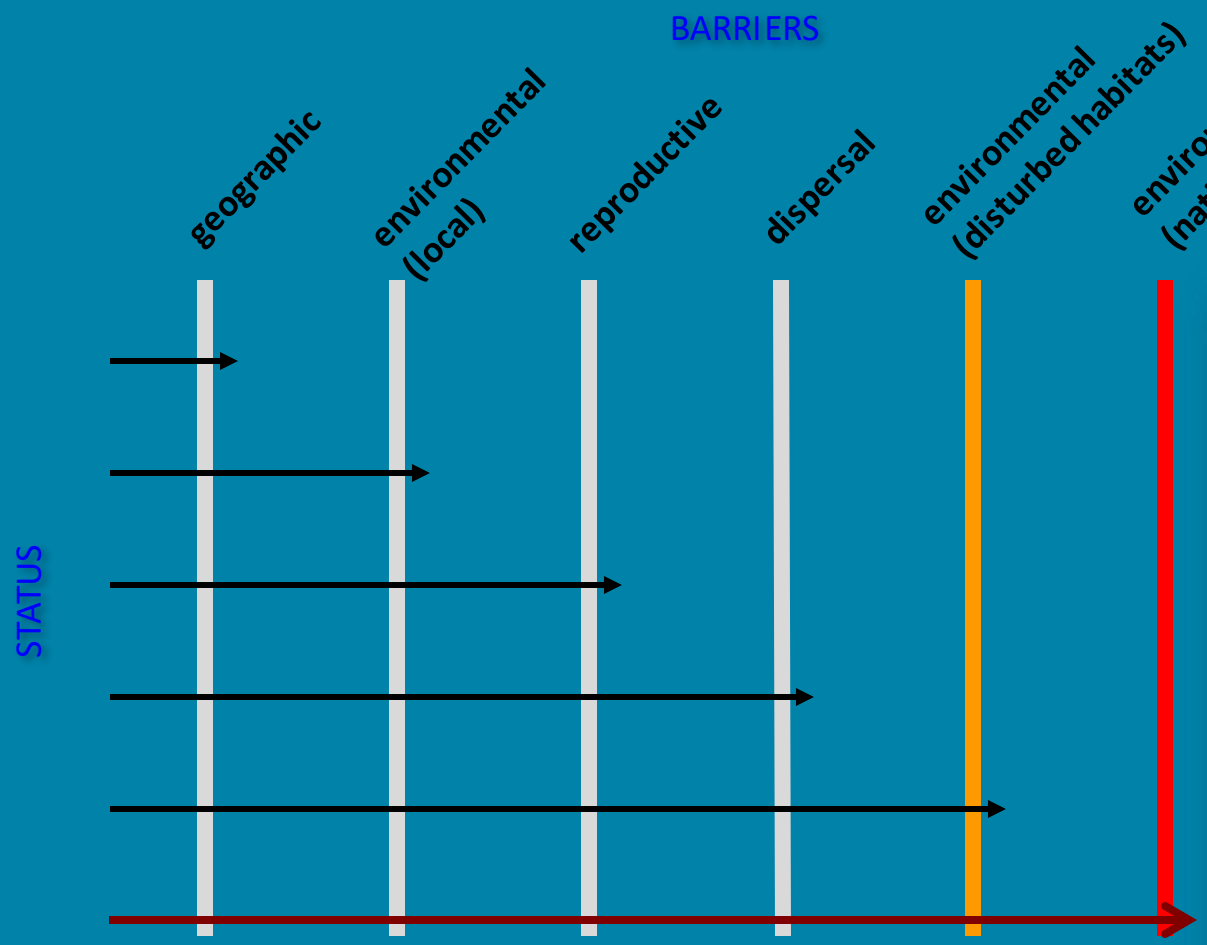
- Have overcome geographic, environmental, reproductive and dispersal barriers
- Able to invade and even dominate disturbed, semi-natural and natural habitats
- Can change the character, condition, form or nature of ecosystems over a substantial area relative to extent of ecosystem

5.3% of KS non-natives



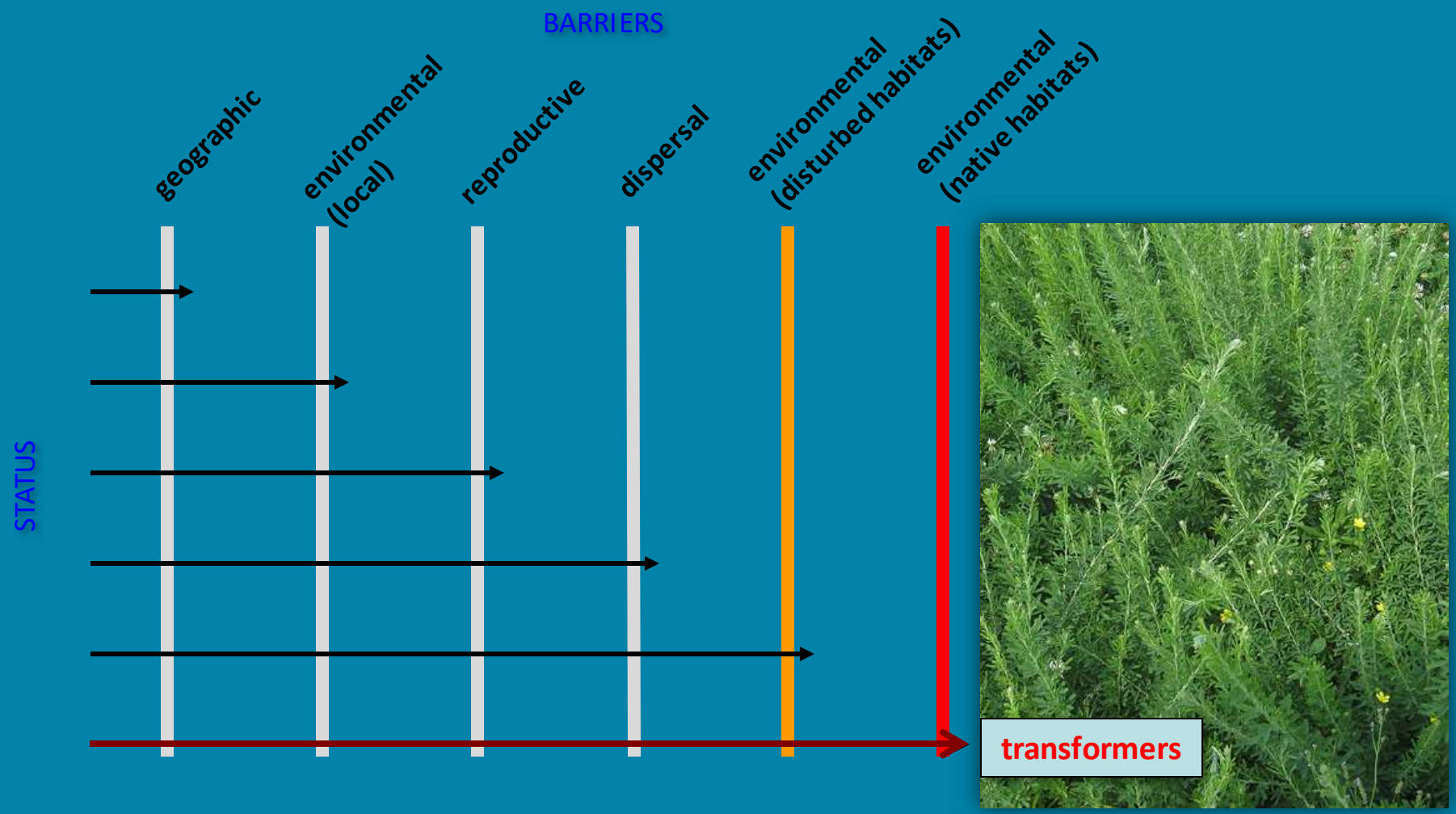
From Craig C. Freeman, Univ. of KS

Transformer Species



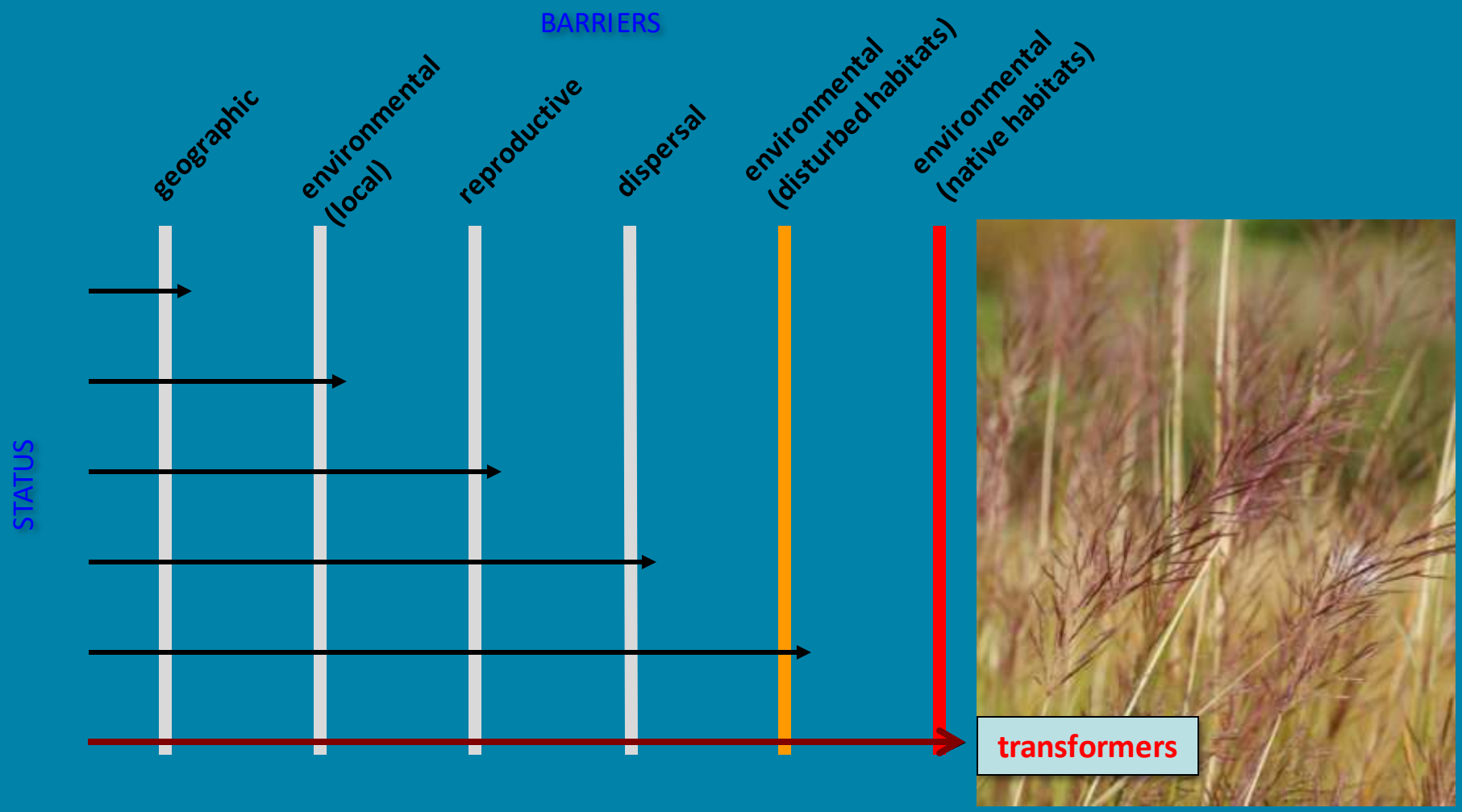
Japanese honeysuckle

Transformer Species



Sericea Lespedeza

Transformer Species



Old World Bluestems

Old World Bluestems (OWB):

Caucasian and yellow bluestems are warm-season perennial grasses that were brought to the United States in the early 1900s for use as forage and to control erosion.

These grasses are less palatable and nutritious to livestock than our native warm-season grasses, and once established are difficult to control.

OWBs produce biochemicals that give them a competitive advantage

Interstitial areas:

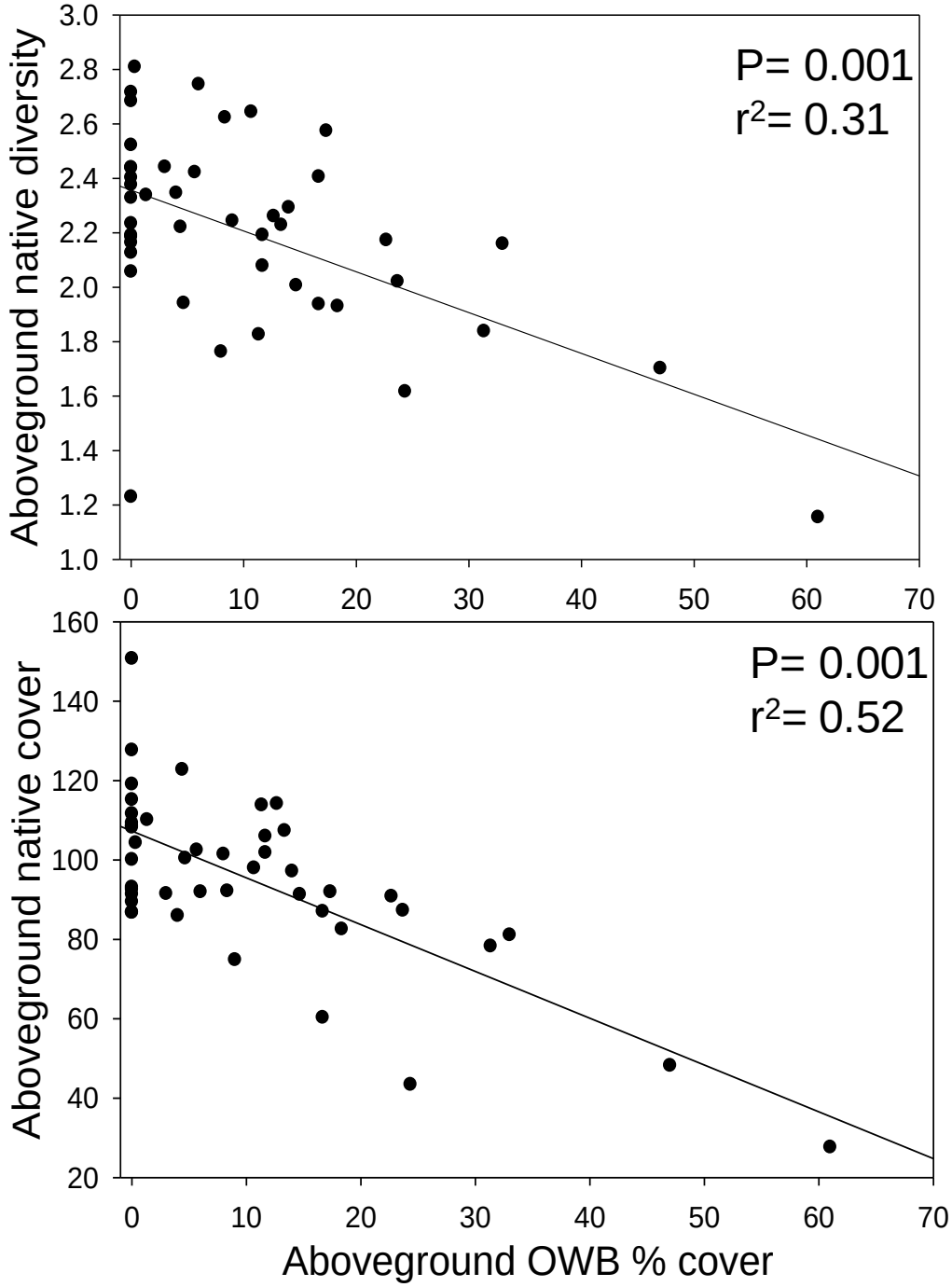
Soil Alterations

Big bluestem

Little bluestem

Caucasian bluestem

Yellow bluestem



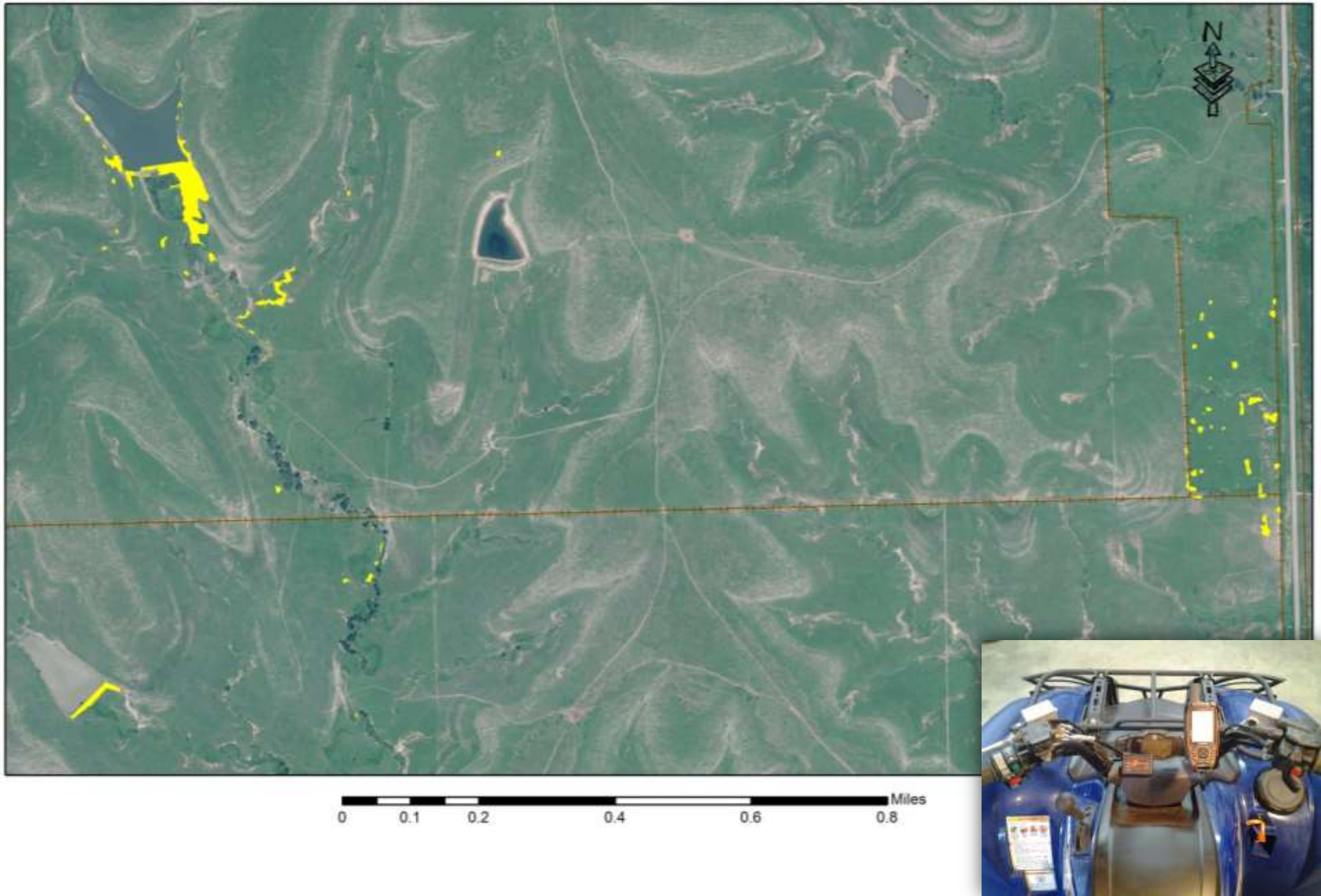
OWB Effects on Native Plant Diversity

- Native species diversity reduced with increasing OWB cover
- Native species cover reduced with increasing OWB cover

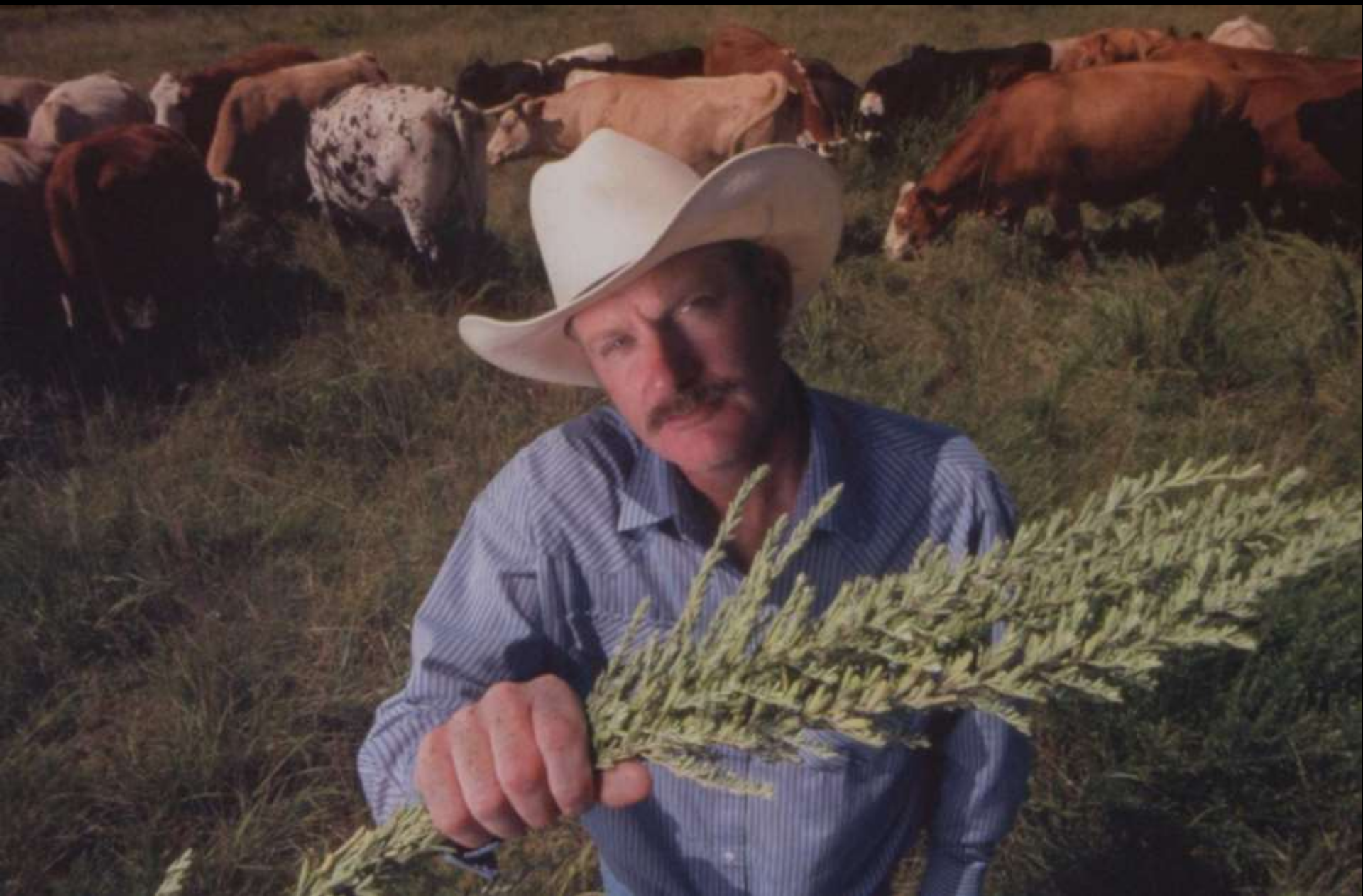
Strategies to deal with OWBs

- Early detection
- Map during dormant season
- Spot treat with appropriate herbicides/rates
- Monitor treatment
- Repeat treatment as needed
- Educate others about risk and treatment options

Mapping of Caucasian Bluestem at the Tallgrass Prairie National Preserve

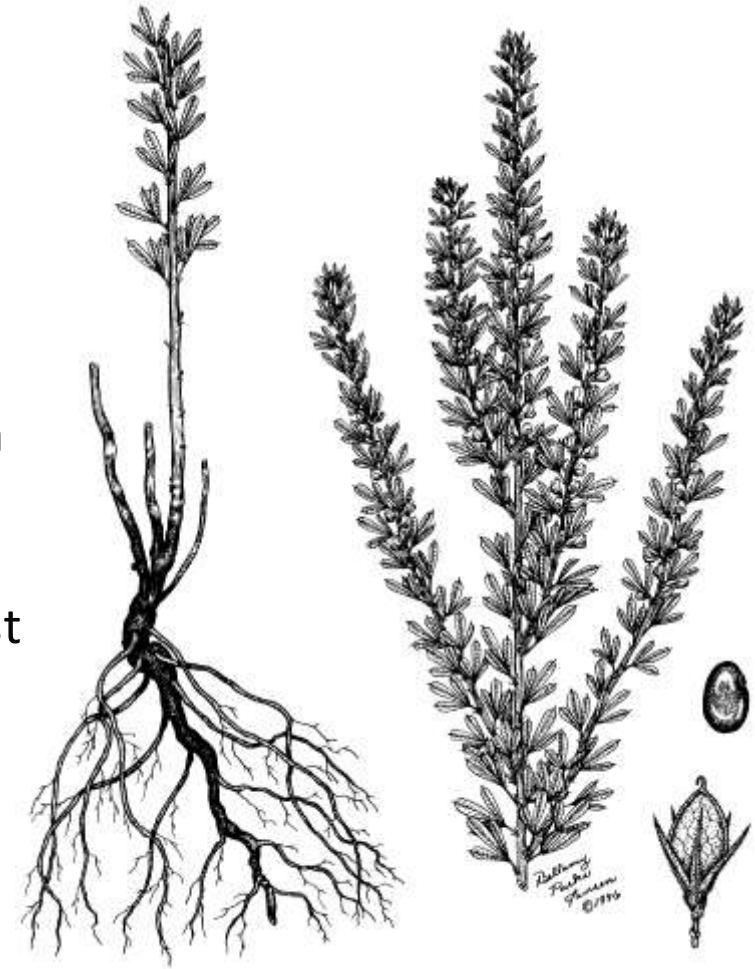


Arsenal
(Imazapyr)



Sericea lespedeza (*Lespedeza cuneata*) is an introduced perennial legume native to eastern Asia

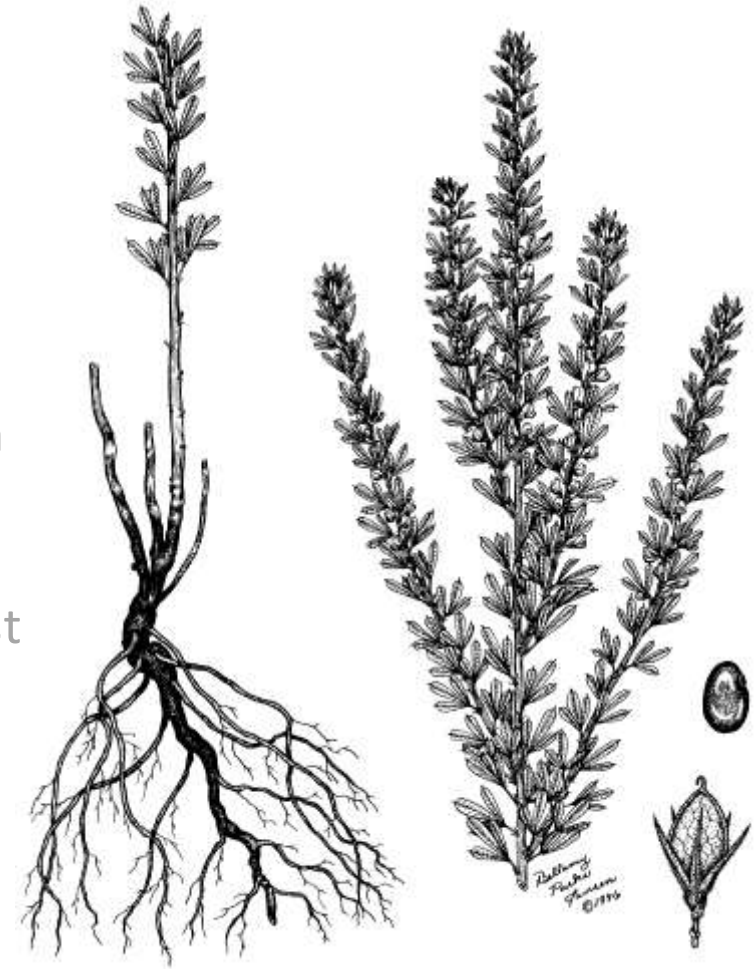
Sericea lespedeza can trace its roots in the United States back to 1896, when it was first planted by the North Carolina Agricultural Experiment Station.



Sericea lespedeza (*Lespedeza cuneata*) is an introduced perennial legume native to eastern Asia

USDA began work with sericea in 1924 for erosion control, hay production and wildlife cover and food. It was planted extensively into pastures in the southeast.

Sericea lespedeza can trace its roots in the United States back to 1896, when it was first planted by the North Carolina Agricultural Experiment Station.

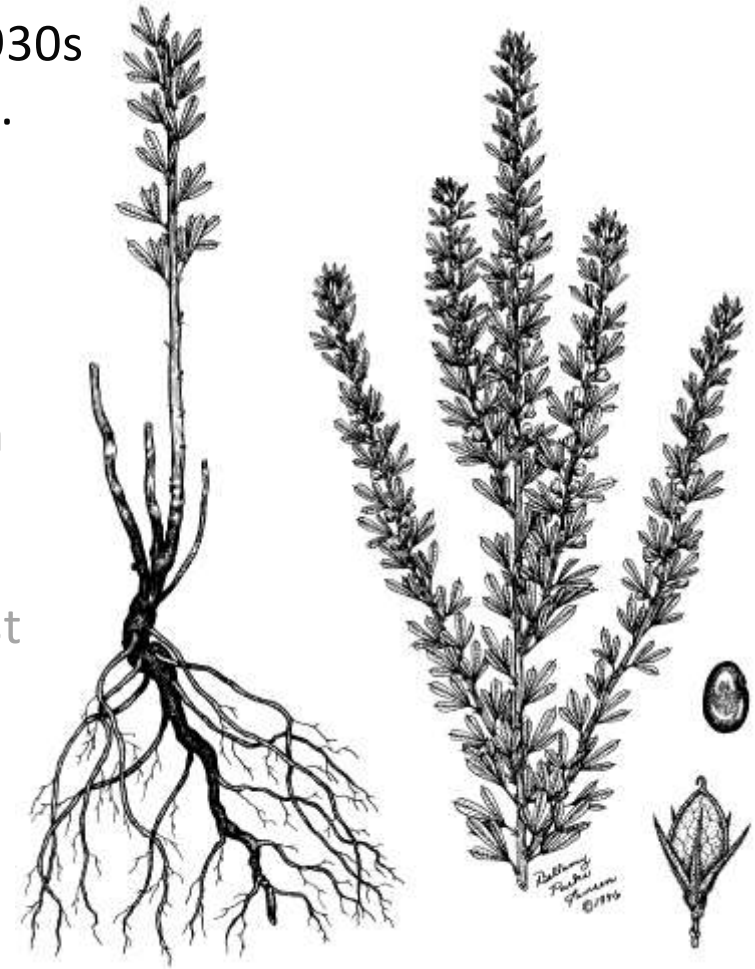


Sericea lespedeza (*Lespedeza cuneata*) is an introduced perennial legume native to eastern Asia

Was planted on strip mine locations during the 1930s in Kansas and Missouri.

USDA began work with sericea in 1924 for erosion control, hay production and wildlife cover and food. It was planted extensively into pastures in the southeast.

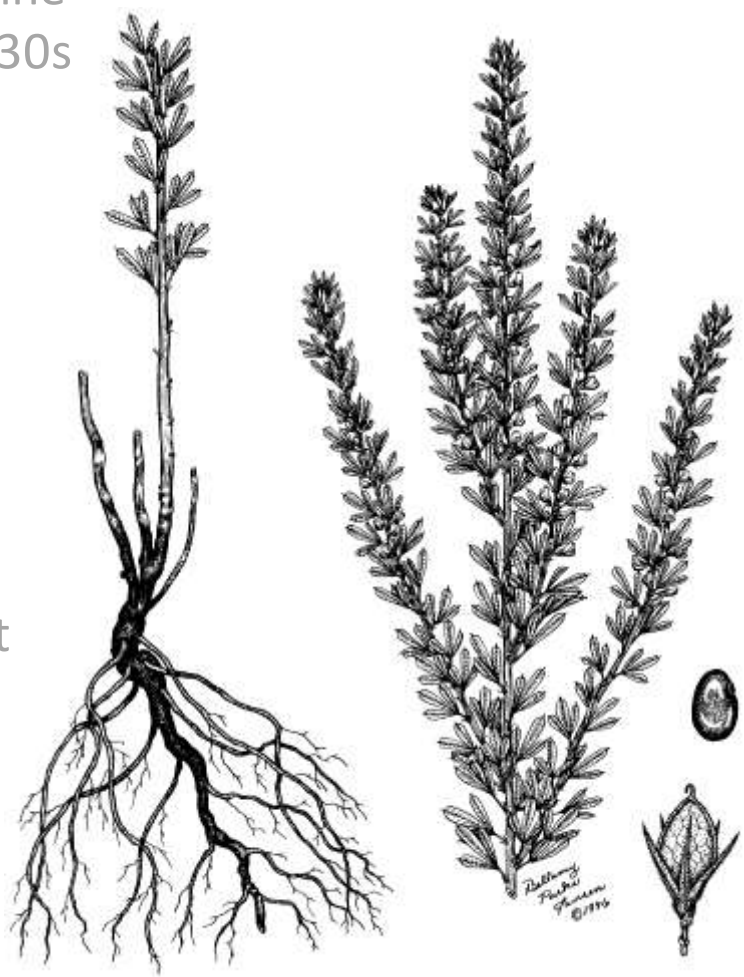
Sericea lespedeza can trace its roots in the United States back to 1896, when it was first planted by the North Carolina Agricultural Experiment Station.



Sericea lespedeza (*Lespedeza cuneata*) is an introduced perennial legume native to eastern Asia

Was planted on strip mine locations during the 1930s in Kansas and Missouri.

USDA began work with sericea in 1924 for erosion control, hay production and wildlife cover and food. It was planted extensively into pastures in the southeast.



Sericea lespedeza can trace its roots in the United States back to 1896, when it was first planted by the North Carolina Agricultural Experiment Station.

More recent establishment is believed to have originated largely from contaminated native seed harvested for CRP (late 1980s). At the time it was not widely accepted as a serious threat.

Mature Sericea plants have been known to produce over 1,000 viable seeds per year per stem. These seeds can remain dormant for many years making control a long, drawn out process.

Cattle avoid sericea lespedeza because of high tannin levels, which gives sericea a competitive advantage in native prairie

Spot spraying sericea is a proven and cost effective way to deal with sericea, provided the infestation is light to moderate. Spot spraying also reduces the impact to beneficial non-target, broadleaf plants.

Table 3. Cost analysis of spot spraying (using a contractor @ $40/hr.) to control sericea lespedeza in native rangeland using metsulfuron, triclopyr and PastureGard®. Actual application rates may vary depending on the level of infestation. See Table 1 for proper mixing rates. Cost estimates are based on local dealer prices of non-generic herbicides; be sure to contact your county noxious weed director to find out if any herbicide cost share programs are available in your county[1].

Level of Infestation	*Area per hr*	*Labor*[2]	*Solution*	Escort XP® *metsulfuron*	Remedy Ultra® *triclopyr*	Pasture-Gard®	*NIS*[3]	Dye	Total cost per acre: Escort XP®	Total cost per acre: Remedy® /PastureGard®
Sparse	20 ac.	$2.00/ac.	1 qt.	4¢/ac.	14¢/ac.	14¢/ac.	1¢/ac.	3¢/ac.	$2.08	$2.17
Scattered	15 ac.	$2.67/ac.	1 gal.	14¢/ac.	55¢/ac.	55¢/ac.	4¢/ac.	11¢/ac.	$2.96	$3.33
Light	10 ac.	$4.00/ac.	2.5 gal.	36¢/ac.	$1.38/ac.	$1.38/ac.	10¢/ac.	28¢/ac.	$4.74	$5.66
Moderate	5 ac.	$8.00/ac.	5 gal.	72¢/ac.	$2.75/ac.	$2.75/ac.	20¢/ac.	55¢/ac.	$9.47	$11.30
Heavy	2.5 ac.	$16.00/ac.	7.5 gal.	$1.07/ac.	$4.13/ac.	$4.13/ac.	30¢/ac.	83¢/ac.	$18.20	$20.96
Severe[4]	...	...	...	...	...	...	...	...	...	...

[1] Escort XP® @ $13.50/oz. (48¢/gm.); Remedy Ultra® @ $105.00/gal. (82¢/oz.); PastureGard® @ $70.00/gal. (55¢/oz.); Activator 90® (Non-ionic surfactant) @ $17.60/gal. (14¢/oz.); Dye @ $54.00/gal. (42¢/oz.). County subsidized and/or generic herbicide products will significantly reduce the cost per acre.

[2] Based on an hourly rate of $40.

[3] NIS = non-ionic surfactant is required for metsulfuron; optional for triclopyr and PastureGard®.

[4] It may not be practical to spot spray sericea lespedeza when the level of infestation is severe.

cast or spot applied. Poor growing conditions, such as extended dry periods and high temperatures, will stress sericea and reduce the effectiveness of herbicides. An early frost may make herbicide applications ineffective as well. Spot spraying following a broadcast application will substantially reduce the need for additional broadcast applications.

Broadcast applications

Broadcast applications should only be made when there is little or no risk of spray drift. Winds speeds should be less than 10 mph, and avoid calm conditions as they may be conducive to air inversions. Twenty gallon per acre (GPA) spray solutions give the best results for ground broadcast applications, whereas a 5 GPA spray solution is recommended for aerial applications. Be sure to use flat-tip nozzles tips (instead of flood nozzles). If one must apply herbicides in hot and dry conditions, set spray equipment to produce larger droplets. Use a non-ionic surfactant with metsulfuron ('escort') at the rate of one quart per 100 gallons of water (Table 2). Also, be sure to use the volumetric measurement cone (ounce-scale version) to ensure accurate herbicide measurements. As with all herbicides, be sure to read and follow label directions for application directions and haying and grazing restrictions.

Table 4. Cost (per acre) for broadcast applications of herbicides to control sericea lespedeza.

	Escort XP® *metsulfuron*	Remedy Ultra® *triclopyr*	PastureGard®
Ground	$11.96	$24.70	$31.25
Aerial	$14.46	$27.20	$33.75

Based on equipment/labor cost estimate of $5.00/ac. for ground applications and $7.50/ac. to spray aerially. See Table 2 for chemical application rates, and Table 3 (footnote) for estimated herbicide and surfactant costs.

No endorsement is intended for chemical product names, and criticism is not implied for chemical products not mentioned.

Concluding remarks

The control of sericea will require a long term effort by land managers. Sericea lespedeza seed can remain viable for many years, and can be spread by water, wildlife, and livestock, making the eradication of sericea lespedeza next to impossible. Therefore, it is important that land managers learn how to manage this plant to prevent bankrupting themselves or the biodiversity of the prairie. It is imperative to begin control measures as soon as the first sericea lespedeza plants are detected. Sericea can be controlled at a minimal cost if detected early and promptly treated by spot spraying. However, yearly inspections and treatments will be required to maintain control of sericea.

For additional information, refer to these publications:

- Ecology and management of Sericea Lespedeza, F-2874 (Oklahoma Cooperative Extension Service)
- Sericea Lespedeza: history, characteristics, and identification, MF-2022 (Kansas State Cooperative Extension Service)

Brian Obermeyer
Flint Hills Project Director
The Nature Conservancy
Cottonwood Falls, KS

Jeff Davidson
Greenwood Co. Ext. Agent
K-State Coop. Ext. Service
Eureka, KS

Gary Kilgore
Retired Extension Specialist
K-State Coop. Ext. Service
Chanute, KS

The authors wish to acknowledge contributions to this publication from the Southeast Kansas Weed Management Area work group, K-State Extension, Multi-state Sericea Work Group and members of the Tallgrass Legacy Alliance.

Spot spraying

Sericea Lespedeza

A cost effective control

A publication of the Tallgrass Legacy Alliance

Drawing of Sericea Lespedeza courtesy of Bellamy Parks Jansen and Oklahoma State University

July 2009 - *This edition replaces previous versions*

Strategies to deal with ~~OWBs~~ sericea

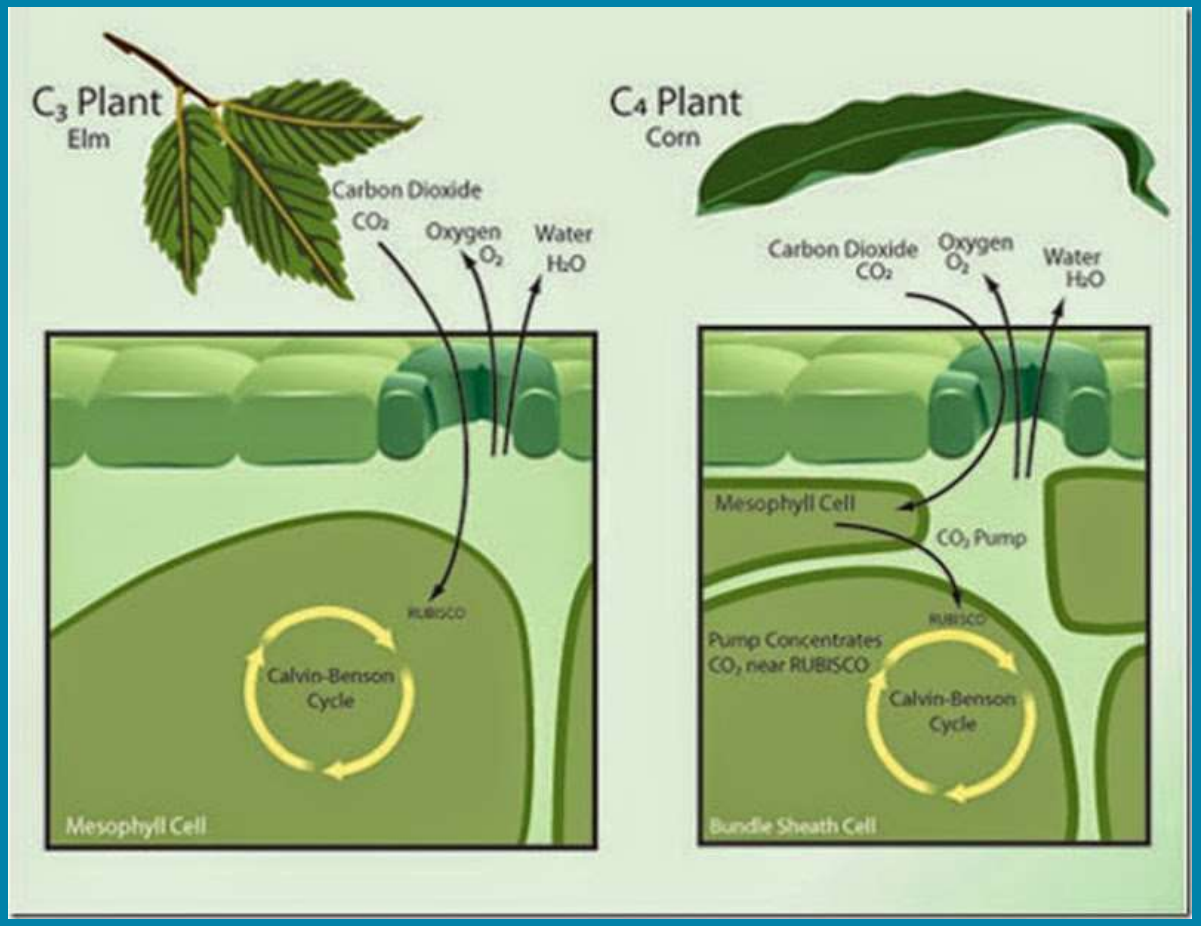
- Early detection
- Map later during ~~dormant~~ the growing season
- Spot treat with appropriate herbicides/rates
- Consider summer or fall burns, corn steep liquor, and possibly even sheep or goats
- Monitor treatment
- Repeat treatment as needed
- Educate others about risk and treatment options

The Nature Conservancy
Protecting nature. Preserving life.™

Are certain species (both native & nonnative) becoming more invasive?

During the past 50 years there has been a significant increase of trees into global savannas and grasslands. The increasing dominance of trees in grasslands is attributed to modified land use, fire regimes, altered temperatures and precipitation, as well as increasing CO2 concentrations.

Are certain species becoming more invasive?

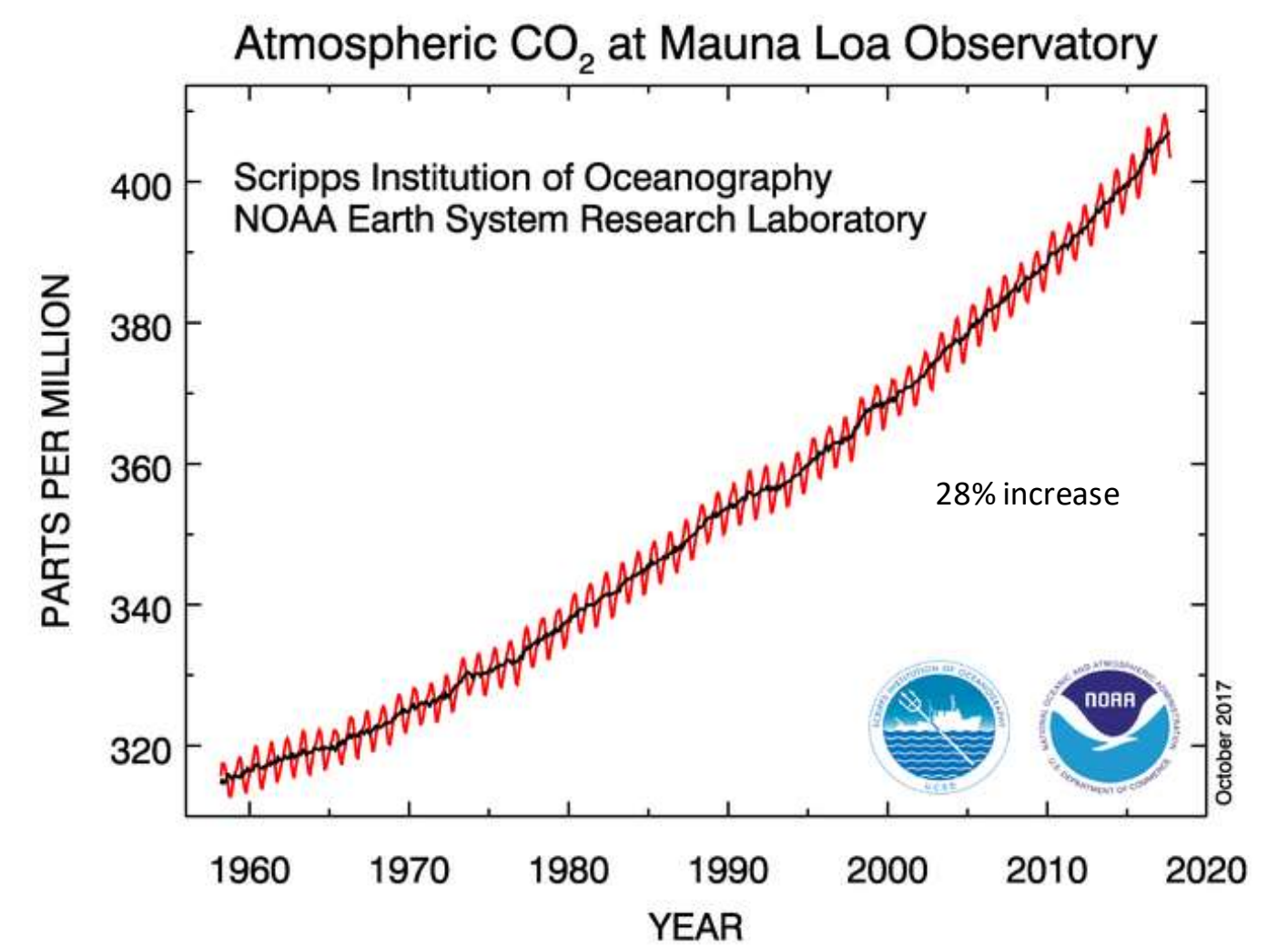


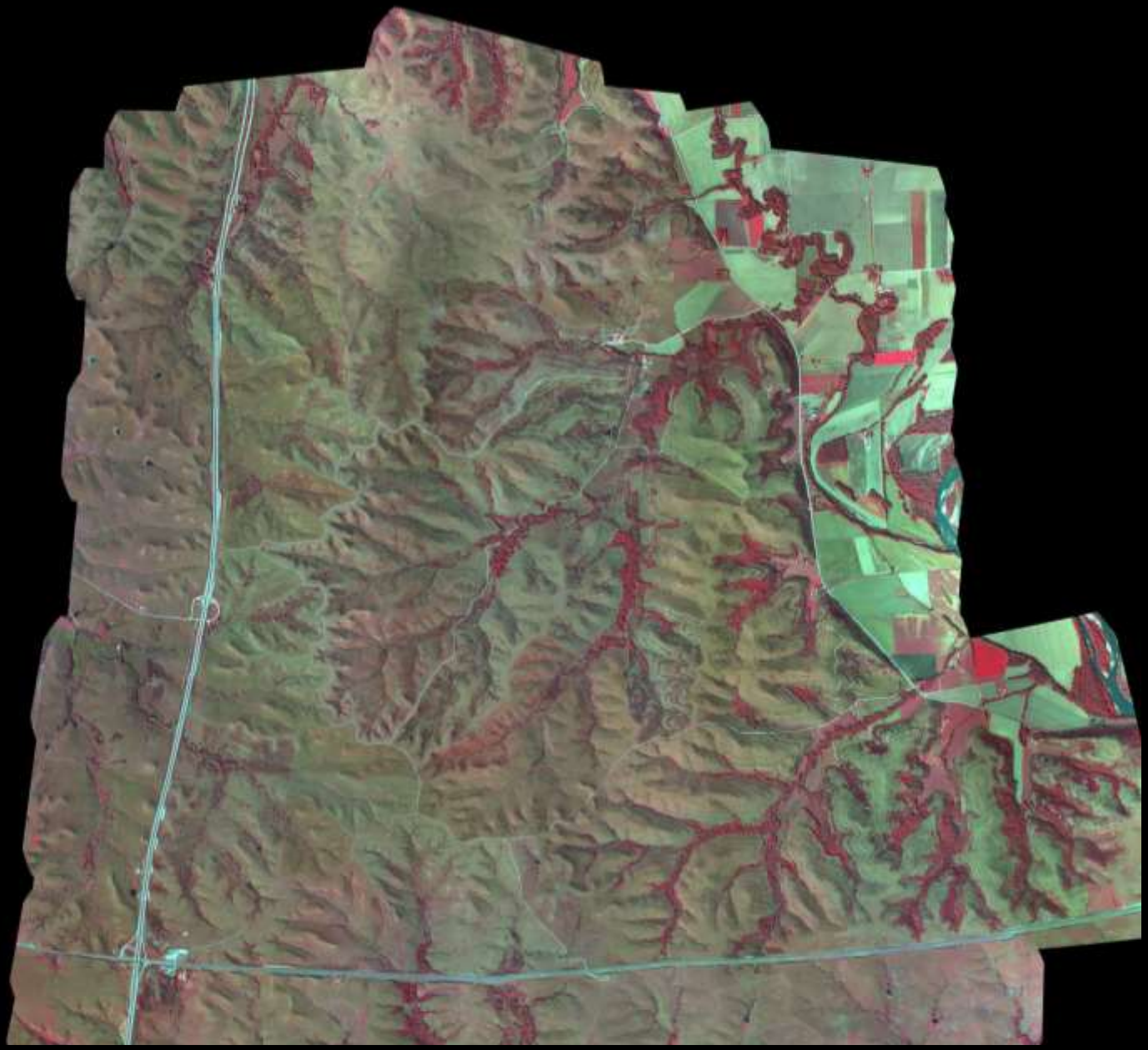
C3 Plants: Carbon fixation and photosynthesis occurs in mesophyll cells on the surface of leaf

C4 Plants: Carbon fixation and photosynthesis is split between mesophyll cells and bundle sheath cells

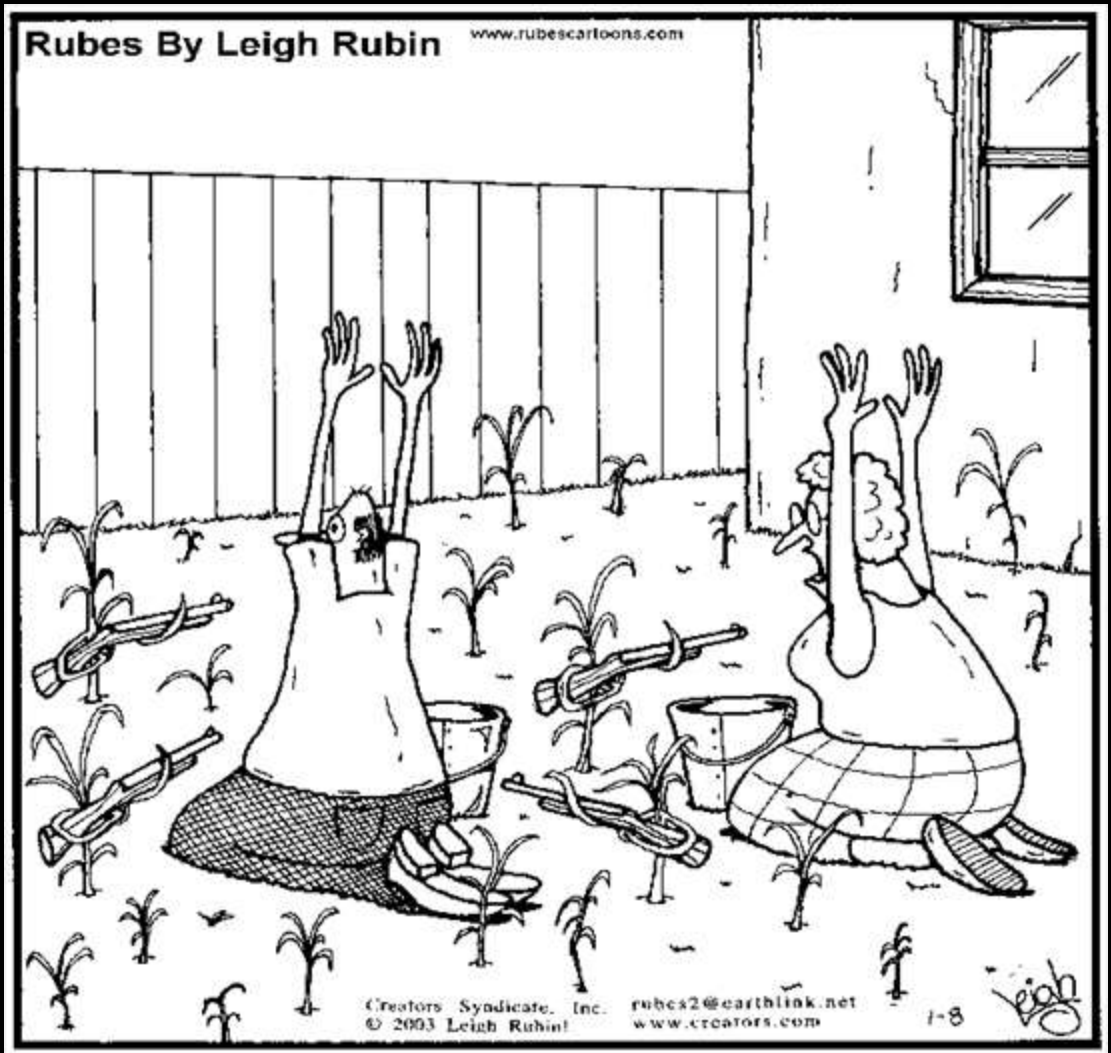
The Nature Conservancy
Protecting nature. Preserving life.™

Are certain species becoming more invasive?





Since 1971, tree density at Konza has increased by two- to 10-fold, except in watersheds burned annually



"We never should have waited this long ...
Now the weeds have *completely*
taken over."